

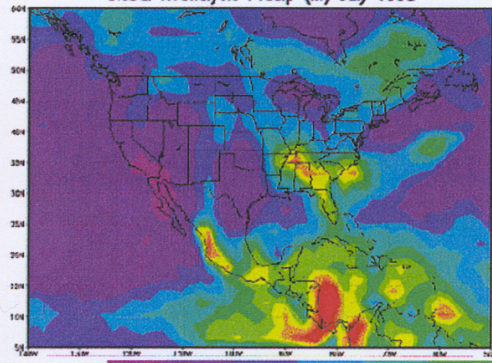
# 16th Conference on Hydrology



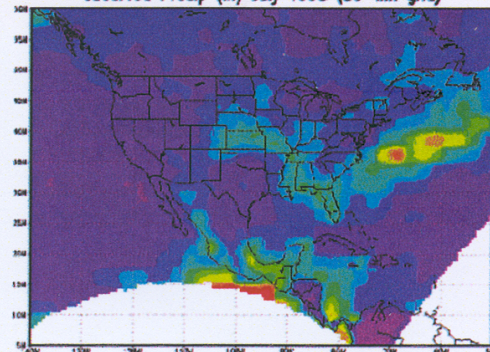
**13–17 January 2002**  
**Orlando, Florida**

## **NCEP Regional Reanalysis Result for July 1998**

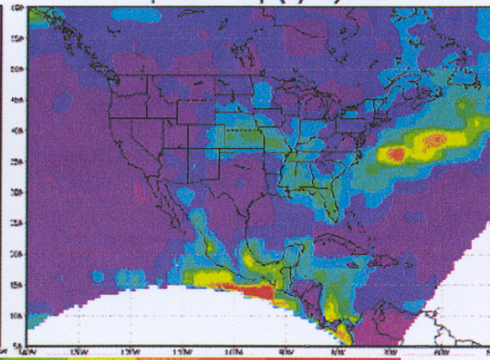
Global Reanalysis Precip (in) July 1998



Observed Precip (in) July 1998 (80-km grid)



Pcp Assim Precip (in) July 1998



AMERICAN METEOROLOGICAL SOCIETY



Jon C. Gottschalck<sup>\*1</sup>, Paul R. Houser<sup>1</sup>, and Xubin Zeng<sup>2</sup><sup>1</sup> NASA / GSFC – UMBC / GEST, Greenbelt, Maryland<sup>2</sup> University of Arizona, Tucson, Arizona

## 1. INTRODUCTION

The parameterization of vegetation in land surface models plays a major role in the simulation of the surface energy balance and therefore weather and climate prediction. Historically, parameters in land surface process models have been assigned based on generalized land surface classifications that do not account for local anomalies in phenology. More recently, however, there have been studies that have incorporated satellite remote sensing data in the parameterization of the vegetation used in land surface models (Sellers et al. 1996; Los et al. 2000; Zeng et al. 2001). Satellite data provides better spatial and temporal resolution and so improved sampling of the seasonal variability of critical vegetation parameters such as leaf area index (LAI) and fractional vegetation cover. Our hypothesis is that using these improved remotely-sensed parameters may produce improved land surface simulations and our group is actively working on incorporating satellite remote sensing data into the Global Land Data Assimilation System (GLDAS, <http://ldas.gsfc.nasa.gov>) currently being developed at NASA's Goddard Space Flight Center and at NOAA's National Center for Environmental Prediction. This paper presents the current state of this work -- our initial methodology and preliminary findings.

## 3. RESULTS AND DISCUSSION

Differences in the assignment of LAI impact a number of processes and variables in CLM2. In this paper we focus on canopy transpiration, soil surface temperature, and total column soil moisture and focus on North America for the sake of clarity. Figure 2 illustrates the difference in canopy transpiration (original LAI – AVHRR LAI) between the two model simulations after one month. There are some substantial differences mainly over the central and western areas of North America (transpiration lower with the AVHRR LAI) caused by the assignment of much higher values of LAI in the original CLM2 (Figure 1). The vegetation types in these areas include grassland and shrubland that equate to lower LAI values

using the radiative transfer algorithm than what other datasets have shown (Sellers et al. 1996; Los et al. 2000). In addition, large areas of cropland in this region are impacted by weather and agricultural changes. The absolute magnitudes in canopy transpiration for the model runs ranged up to  $350 \text{ Wm}^{-2}$ .

Less canopy transpiration alters the surface energy balance through lower total latent heat flux. Figure 3 illustrates the difference in soil surface temperature and shows a signature very similar to that of Figure 2 with warmer soil surface

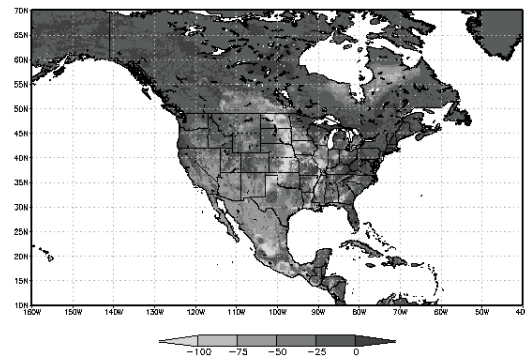


Figure 2: Difference in canopy transpiration (original LAI – AVHRR LAI) in  $\text{Wm}^{-2}$  valid on 30 June 2001.

temperatures in western North America and in parts of the southeast US and Mississippi River valley where the AVHRR dataset indicates areas of lower LAI. In addition, greater solar radiation enters the soil and allows higher temperatures. The differences are substantial and are range up to and over  $10^\circ \text{C}$  warmer for the AVHRR simulation in parts of the central and western US and Mexico. The AVHRR simulation also shows that the soil surface temperature across the whole continent for the most part is warmer than with the original LAI designation. The absolute temperatures in both model runs generally ranged from  $260 - 330^\circ \text{K}$  globally.

The lower transpiration in these areas limits the loss of total soil moisture content for the AVHRR simulation (Figure 4). The soil is significantly moister across Mexico for instance.

\* Corresponding author address: Jon C. Gottschalck, Hydrological Sciences Branch – Code 974, NASA / Goddard Space Flight Center, Greenbelt, MD 20771; e-mail: [jgotts@hsb.gsfc.nasa.gov](mailto:jgotts@hsb.gsfc.nasa.gov).